Intro

Preventive Medicine

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Good Health

THINK TB

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Purpose

- Provide information on Tuberculosis and the treatment of TB Infection and TB Disease

Objectives

1 of 2

1. Describe the history of Tuberculosis
2. Describe the transmission of Tuberculosis
3. Identify Tuberculosis Classification system
4. Describe procedures and reading of Mantoux Tuberculin Skin Test
5. Explain difference between TB Infection and TB Disease

Objectives

2 of 2

6. Describe treatment practices for TB Infection
7. List risk factors for development of TB Disease
8. Describe signs and symptoms of TB Disease
9. Describe treatment of TB Disease

History of TB

- Tuberculosis also known as consumption, wasting disease, and the white plague

- 3400 BC - Potts disease residual- Egyptian mummies
- 460-375 BC - Hereditary etiology- Hippocraties
- 384-322 BC Contagious nature of Phthisis-Aristotle

History of TB

- 131-200 AD Danger of living with Phthisis cases- Galen
- 1865 TB proved contagious- Villemin
- 1882 Bacteria that causes TB discovered- Koch
- 1943 Streptomycin discovered to kill TB- Waksman

History of TB

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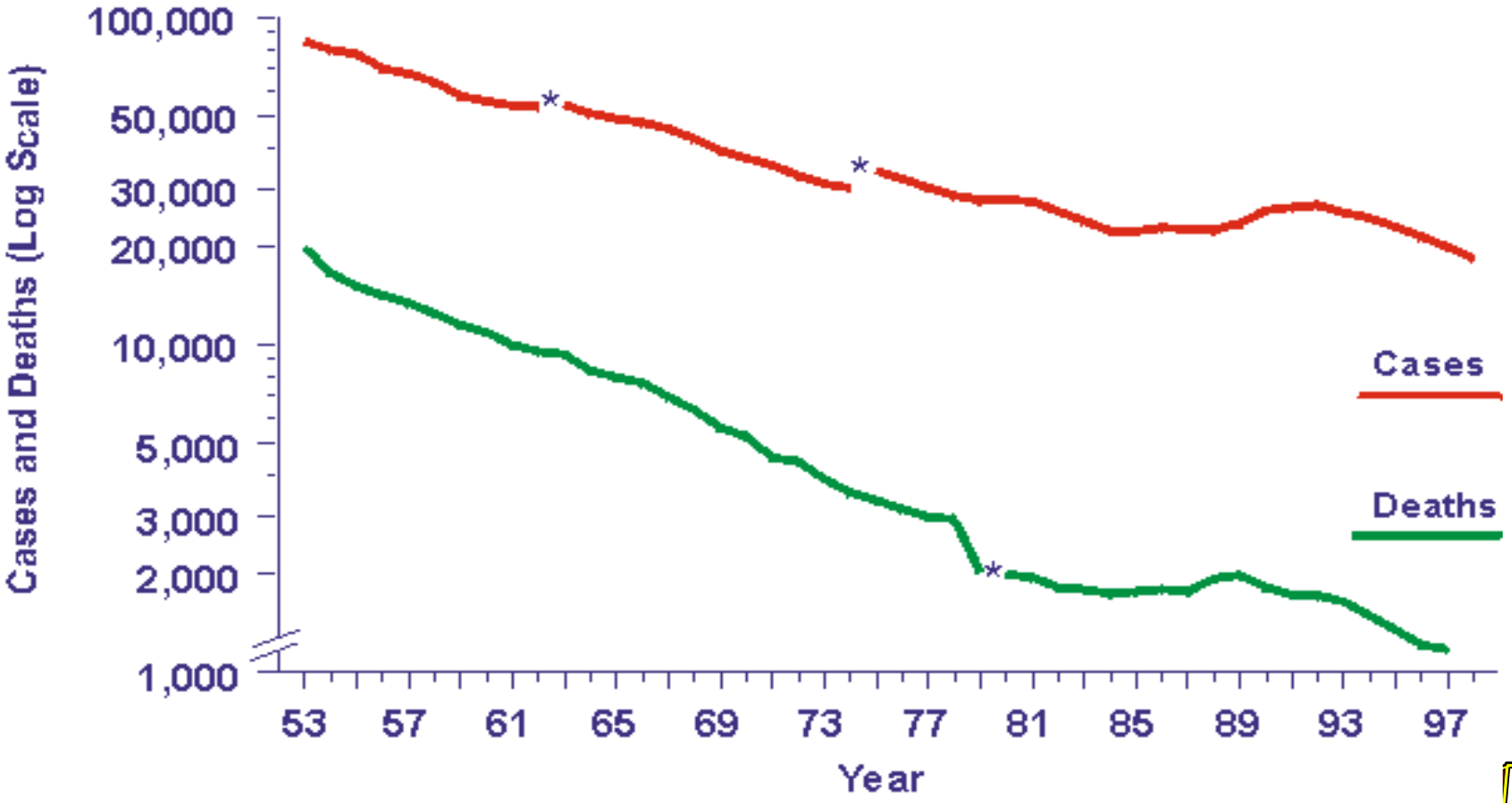
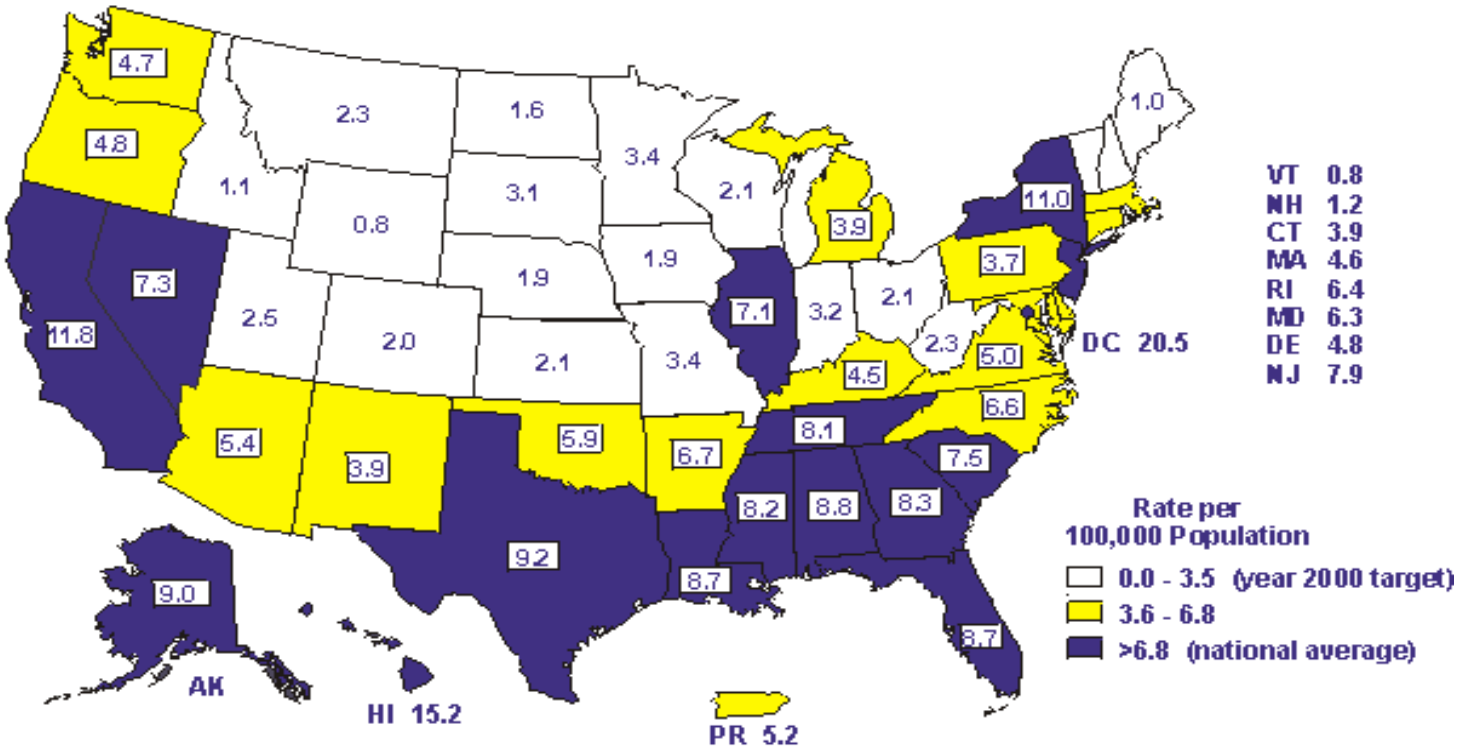
- 1953-1984 Number of TB cases decreased an average of 6% year in the US
- 1985- 1993 TB cases increased
- 1994-present TB cases decreased

Figure 2. Tuberculosis Cases and Deaths United States, 1953 - 1998



*Change in reporting criteria
Note: 1998 deaths are not available.

Figure 1. Tuberculosis Case Rates, United States, 1998



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Classification System for

Classification System for TB		
Class	**Type**	**Description**
0	No TB Exposure Not Infected	No history of exposure Negative reaction to TB skin test
1	TB exposure No evidence of infection	History of exposure Negative reaction to TB skin test
2	TB infection No Disease	Positive reaction to TB skin test Negative bacteriologic studies(if done) No clinical or radiographic evidence of TB
3	Current TB Disease	M. Tuberculosis cultured(if done) OR Positive Reaction to TB skin test AND Clinical or radiographic evidence of current disease
4	Previous TB Disease	History of episode(s) of TB OR Abnormal but stable radiographic findings, Positive reaction to the TB skin test, Negative bacteriologic studies, AND No clinical or radiographic evidence of disease
5	TB suspected	Diagnosis pending

Transmission of Tuberculosis

- Caused: Mycobacterium tuberculosis
- Spread: Airborne

  Droplet nuclei
- Affected: Infectiousness of patient

  Environmental conditions

  Duration of exposure

Transmission of Tuberculosis

- Most large droplets become lodged in the upper respiratory tract (where infection unlikely to develop)
- Droplet nuclei may reach alveoli where infection begins
- May spread via bloodstream to any part of the body

Mantoux TB Skin Test

- 0.1 ml of 5 TU PPD administered intradermally
- Read reaction at 48-72 hours
- Measure only the induration in

Classifying the Tuberculin Reaction

≥ 5 mm is Positive in:

- Persons known to have or suspected of having HIV infection
- Close contacts of a person with infectious TB
- Persons who have a chest radiograph suggestive of previous TB
- Persons who inject drugs

Classifying the Tuberculin Reaction

≥ 10 mm is Positive in

- Persons with certain medical conditions, excluding HIV
- Persons who inject drugs (if HIV negative)
- Foreign born persons from areas where TB is common
- Medically underserved, low income populations, including high risk racial and ethnic groups
- Residents of long term care facilities
- Children younger than 4 years of age
- Locally identified high prevalence groups (migrant farm workers or homeless persons)

Classifying the Tuberculin Reaction

≥ 15 mm is Positive in

- All persons with no known risk factors for TB

False Positive/Negative Reactions

False-Positive and False-Negative Reactions to the TB Skin Test			
Type of Reaction	Possible Cause	People at Risk	Action to Take
False-Positive	1. Nontuberculosis mycobacteria 2. BCG vaccination	1. People infected with nontuberculosis mycobacteria 2. People vaccinated with BCG	1. Evaluate for TB disease if person has TB symptoms 2. Assess likelihood of true TB infection
False-Negative	1. Anergy 2. Recent TB infection 3. Very young age	1. HIV-infected people, other people with weakened immune systems 2. People infected with M. tuberculosis within the past 10 weeks 3. Children younger than 6 mo old	1. May do anergy testing 2. Retest 10 weeks after exposure to TB ended 3. Retest when child is 6 mo old and 10 weeks after exposure to TB ended

BCG Vaccination

- No reliable way to distinguish a positive tuberculin caused by vaccination with BCG from a reaction by true TB infection

-Likely to be due to TB infection if the following are true:

* The reaction is large

* The person was vaccinated a long time ago

* Person come from a TB endemic area

* Person has been exposed to someone with infectious TB

disease

* Person's family has a history of TB disease

TB Infection vs TB Disease

TB Infection	TB Disease
Tubercle bacilli in the body	
Tuberculin skin test reaction usually positive	
Chest x-ray usually **normal**	Chest x-ray usually **abnormal**
Sputum smears and cultures **negative**	Sputum smears and cultures **positive**
No symptoms	Symptoms such as cough, fever, weight loss
Not infectious	Often infectious before treatment
Not a case of TB	A case of TB

Treatment of TB Infection

High Priority Candidates

- Persons with a positive skin test reaction in the following high risk groups regardless of age:
  - Persons known to have or suspected of having HIV infection
  - Close contacts of a person with infectious TB
  - Persons who have a chest radiograph suggestive of previous TB
  - Persons who inject drugs
  - Persons with certain medical conditions
  - Recent TB skin test convertors

Treatment of TB Infection

High Priority Candidates

- Persons with a positive skin test who are younger than 35 years of and in the following groups:
  - Foreiegn born persons from areas where TB is common
  - Medically underserved, low income populations
  - Residents of long term care facilities
  - Children younger than 4 years of age
  - Locally identified high prevalence groups

Treatment of TB Infection

(Preventive Therapy)

- CXR, LFT
- Primary: Isoniazid
  - Adults: 300 mg qd x 6 mo
  - Children:10-15mg/kg/day (not to exceed 300mg) qd x 9 mo
- Alternative: Rifampin
  -Adults: 600mg qd x 6 mo
  -Children: 10-20mg/kg/day (not > 600 mg) x 6 mo

Treatment of TB Infection

Preventive Therapy

- Preventive Therapy might not be indicated for:

- Persons at high risk for adverse reactions to INH
- Persons who cannot tolerate INH
- Persons likely to be infected with drug resistant M. tuberculosis
- Persons who are unlikely to complete a course of preventive therapy

Risk Factors for Developing TB Disease

- High risk groups include:
  - People with HIV
  - People with other medical conditions that appear to increase the risk of TB
  - People recently infected with M. tuberculosis (within 2 years)
  - People with chest x-ray findings suggestiv of previous TB
  - People who inject illicit drugs

Diagnosis of TB Disease

Evaluation

- Medical history
- Physical examination
- Mantoux tuberculin skin test
- Chest x-ray
- Bacteriologic exam (smear and sputum)

Diagnosis of TB Disease

- Pulmonary TB:

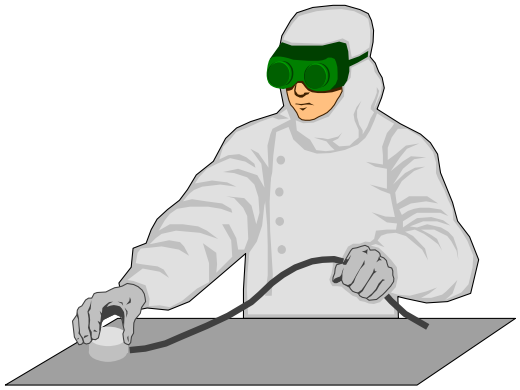
- Productive prolonged cough, Chest pain, Hemoptysis

- Systemic Symptoms:
  - Fever
  - Chills
  - Night sweats
  - Fatigability
  - Loss of appetite
  - Weight loss

Treatment of TB Disease

- Four Drugs in initial regimen:
  - Isoniazid (INH)
  - Rifampin (RIF)
  - Pyrazinamide (PZA)
  - Ethambutol (EMB) or Streptomycin (SM)
- Adjust regimen when drug susceptibilty results are known
- Three drugs (INH, RIF, PZA) may be adequate for initial regimen if drug resistance very unlikely

Tuberculosis Respirator Fit Testing and Training



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General Information

- Why is a respirator necessary?
  - » Mandated by OSHA for protection of employee exposure to TB.
- Employee exposure is defined as an exposure to a concentration of an airborne contaminant that would occur if the employee were ***not*** using respiratory protection.

Program Requirements

- Written program (MEDDAC Reg. 40-93)
- Medical evaluation
- Respirator selection
- Fit testing
- Respirator use
- Training
- Program evaluation

Medical Evaluation

- You are required to complete a Respirator Medical Evaluation Questionnaire which will be reviewed and kept by OH.
- If there are any abnormalities that you have identified on the questionnaire, OH will contact you for additional medical surveillance.

Disqualifying Medical Conditions

- The following are conditions that may prevent the use of a respirator:
  - Seizures
  - Claustrophobia
  - Asthma
  - Emphysema
  - Pneumonia
  - Collapsed Lung
  - Lung Cancer
  - Broken Ribs
  - Chest Injuries/Surgeries
  - Any other lung problems
  - Heart or Circulation problems
  - Anxiety

Respirator Issue

- A respirator will be issued to you when you are fit tested.
- This is your respirator to use.
- ***DO NOT USE ANY OTHER RESPIRATOR OTHER THAN THE ONE YOU HAVE BEEN ISSUED!***

Respirator Selection

- The respiratory protection that will be used for the TB program is a half-face negative air purifying respirator with P100 cartridges.
- You will be issued one of the following respirators:

Survivair MSA 3M Protech

What is a Negative Air Purifying Respirator ?

- A respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator; ***and***
- A respirator with an air purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air purifying element.

Filter

- A component used in respirators to remove solid or liquid aerosols from the inspired air. Also called air purifying element.
- P100 filters are used for the TB respiratory protection program. The P100 filters are at least 99.97% efficient in removing monodisperse particles of 0.3 microns in diameter.

Filter Change Out Schedule

- You will replace your filter if you have been exposed to TB for an 8 hour period

OR

- After one year and during your annual fit test

Limitations and Capabilities

- Oxygen level in atmosphere must be between 19.5% and 21%
- Will only work with corresponding filters or cartridges
- Can protect you from hazardous levels of materials
- If worn properly and in the right atmosphere, respirators will prevent infection

Fit Testing

- Before an employee uses any respirator with a negative or positive pressure tight-fitting facepiece, the employee must be fit tested with the same make, model, style, and size of respirator that will be used.
- A Qualitative Fit Test will be used. This is a pass/fail test to assess the adequacy of the respirator on the individual’s response to the test agent

Fit Testing

- Employees using a tight fitting facepiece respirators must pass an appropriate qualitative fit test (QLFT):
  - prior to initial use
  - whenever a different respirator facepiece (size, style, model, or make) is used, and
  - annually thereafter.

Fit Testing

An additional fit test must be conducted when there is a change in the employees physical condition (e.g. facial scarring, dental changes, cosmetic surgery, or obvious change in body weight) that could affect respirator fit.

Fit Testing

- Fit testing is conducted using one of the following:

  Banana Oil Saccharin Solution

  Bitrex Solution Irritant Smoke

- A sensitivity test will be administered prior to donning of the respirator. A sensitivity test is used to determine if personnel can detect one of the above odors.

Fit Testing

- Personnel will don their respirators 10 minutes prior to fit testing to ensure a proper facepiece to face seal.
- Personnel will conduct a negative and positive pressure check.
- Personnel will be placed in the test chamber

Fit Testing

Personnel will be put through a series of facial movements. These are:

- Normal breathing
- Deep breathing
- Nodding head from side to side
- Nodding head up and down
- Normal breathing
- Rainbow Passage

Fit Testing

If at any time personnel detect the taste or smell of the aerosol, they will be pulled out of the test chamber. The respirator will be re-fitted the first time. If unsuccessful, another type of respirator will be used.

Inspection

Always inspect respirator before donning.

- Check the integrity of the seals and cartridges.
- Check the integrity of the headbands.
- Check the integrity of the facepiece.

Maintenance and Storage

- Clean your respirator after each use. A mild soap with warm water is adequate. ***DO NOT GET YOUR CARTRIDGES WET!!!!!!***
- Air dry your respirator.
- After your respirator is cleaned place the respirator in a sealed bag and store in a clean, secure location.

The End

Proceed to Test by double clicking on the link below

MEDDAC Respiratory Protection